

BIOGRAPHY

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EARLY PROPONENT OF EXTERNAL SKELETAL FIXATION

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NEW YORK, NEW YORK

REPRINTED FROM NEW SERIES, VOL. LXVI, NO. 3, DECEMBER, 1944, PAGES 409-413

The American Journal of Surgery

(Reg. U. S. Pat. Off.)

PUBLISHED MONTHLY BY THE AMERICAN JOURNAL OF SURGERY, INC., NEW YORK

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THE history of medicine contains numerous examples of identical discoveries made independently by different individuals.¹ In some instances the two discoveries were made almost simultaneously while in others considerable time had elapsed between them. This is no less true in the history of orthopedic surgery. Lister's operation for the fracture of the patella in 1877 was successfully performed sixteen years earlier by Cooper, an American, using alcohol as an antiseptic. J. H. Rodgers, another American, successfully wired an ununited fracture of the humerus in 1827, forty-six years before this method was used for fracture of the mandible by Thomas. The method of drilling the bone ends to hasten union, though introduced by Bohler, of Vienna, after the last war, was described eighty years previously in Brainard's essay published in New York.²

The treatment of fractures by external skeletal fixation is a relatively recent development in orthopedic surgery. Nevertheless, we find a rather complete description of this method by James Bolton as early as 1864 with a report of a patient treated in 1853.

Bolton presented his method in the Confederate States Medical and Surgical Journal while he was a surgeon in the Confederate States Army.³ At the time his "New Method of Treating Ununited Fracture of Long Bones" appeared, he was serving as surgeon in charge of the 3rd Corps Receiving Hospital. His work

here offered ample opportunity to observe and become disturbed by the high mortality accompanying fractures of the long bones.

There is no evidence that James Bolton was at any time particularly interested in orthopedic surgery. A native of Savannah, he was taken to New York during his childhood, received his A. B. from Columbia in 1831 and his M. D. from the College of Physicians and Surgeons in 1836. After studying the diseases of the eye and ear with Dr. John Kearney Rogers and serving some time as clinical assistant to Dr. Valentine Mott, he began to practice in Richmond. In 1842, his "Treatise on Strabismus, etc." appeared. It contained a description of "the steel hook with its guard" which Bolton invented for the purpose of decreasing the drying of the eye and the temptation to wink during the operation. He also reported eight successful cases involving its use. His contribution was well received both in this country and abroad.

With the discovery of anesthesia, James Bolton became interested in its use. In 1851, he reported his experience with ether in operations on hemorrhoids. An article appearing in 1852 under the title "A Test for the Safety Point in Anesthesia" described his work with chloroform. This was a very pressing question at the time, since physicians were very much concerned about the safety of the new anesthetic agents. Bolton's work did much to encourage their use.

Moreover, he occupied a leading position in his profession. In addition to editing a medical journal and serving as chairman

attending surgeons, sick & wounded officers and men, and attendants such as cooks, nurses, etc. For these I now have scant rations for two



FIG. 1. James Bolton, M.D. and his wife, Anne Maria Harrison Bolton.

of important committees of the American Medical Association in 1858, he was president of the Medical Society of Virginia.⁴

James Bolton was fifty-one years of age when he left a lucrative practice to serve as a surgeon in the army. Nevertheless, he carried into his military work the energy and enthusiasm for his calling that was so evident in his earlier civilian life. His letter dated May 29, 1864 to Wm. A. Carrington, Medical Director of the Hospitals of Richmond, is revealing not only of the times, but also of the man.⁵ In it he writes:

"Sir:

"Being unable to communicate with the proper medical officer in the field I have to state to you my present condition. There are at this post eighty-three persons including

days. This whole country has been drained of provisions so that the inhabitants have not a sufficient supply for domestic consumption. My small stock of stimulants is exhausted and I have but a few articles of medicine and those I am compelled to use sparingly. Under these circumstances it is not surprising that my rate of mortality is frightful and unless some relief be obtained all must die who have not strength of constitution to bear up against these adverse circumstances. I am utterly unable to give relief and can only stand by and see my men sinking for lack of medicine and sustenance. The picture which I have drawn of the condition of my hospital is but a counterpart to those of the other hos. corps in my neighborhood. In all these hospitals subsistence is required for about five hundred men. A considerable number of the sick and wounded will bear transportation and many

of the hospital attendants are able bodied men who ought to be with their commands.

"I therefore respectfully urge upon you to give your *immediate* attention to this subject. I respectfully suggest that a train of twenty ambulances and an equal number of wagons be forwarded to this post as promptly as possible sending by them subsistence sufficient to relieve our pressing necessities. On its return this train might be laden with the sick and wounded capable of bearing transportation. By two trips nearly all could be carried off and a large number of able bodied men could then be returned to their commands and the surgeons now almost uselessly employed could be returned to their respective posts of duty.

"By your prompt attention to the subject of this communication you will perform an act of humanity and greatly oblige

"Yours very respectfully,

"James Bolton, Surg., P.A.C.S.

"in chg. 3rd Corps Receiv'g hospl."

Bolton was not simply a civilian doctor in a military organization. He quickly grasped the fundamental principle that "In military service, it is not only the best method of treatment that must be considered, but one that permits treatment of a large number of casualties in limited time."⁶ This is clearly exemplified in his evaluation of a vulcanite interdental splint which was developed during the war for treatment of fracture of the jaws by James Baxter Bean,¹² a Southern dentist. Bolton writes of Bean's device, "The interdental splint . . . appears to me to approximate perfection as nearly as we are likely to reach. The means of preparing it, however, are not always at hand. The splint hereafter described (using gutta percha) has the advantage of greater simplicity, of fulfilling the indications in a similar though less perfect manner and may be always within the reach of the surgeon."⁷ It must be remembered that Bolton had spent the major portion of his professional life in civilian practice. Nevertheless, at the age of fifty-one he was sufficiently young and flexible to adopt wholeheartedly the viewpoint of the military surgeon.

It is this adaptability together with the humanity and professional integrity ex-

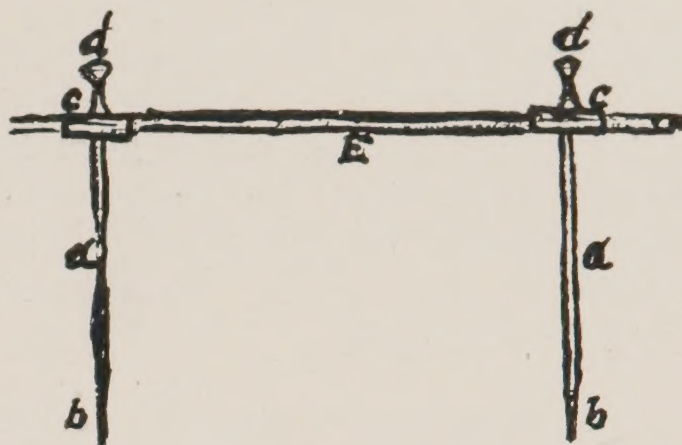


FIG. 2. James Bolton's "Instrument." "My observations," Bolton wrote, "on cases of gun-shot wounds of the thigh, with fracture of the bone, have impressed me strongly with the unsatisfactory character of the ordinary methods of treating them." After listing the many difficulties which accompanied these methods he stated that "Amputation is only an exchange of risk of death by exhaustion, for risk of death by shock." He then asked attention to his new method by which he proposed "to secure co-aptation, adaptation and quietude." The method which Bolton used in 1853 is described thus:

"Two steel rods, *a*, three inches in length were each cut at one end into a screw, *b*, three-eighths of an inch long. To the other end was attached at right angles, a hollow cylinder, *c*, having on its upper surface a screw, *d*. A steel rod, *e*, five inches long, completed the instrument. The patient was anaesthetized, and powerful extension was used until the limb was brought to the proper length. The point of a scalpel was then thrust down to each fragment, one inch from the extremity, and a hole was drilled in each as far as the medullary canal. In these holes the rods, *a*, were screwed. The ends of the bone were then adjusted by pressure upon one rod and by traction upon the other. When adjustment was complete, the cylinders, *c*, were in a line with each other. The rod, *e*, was then passed through them and secured by the screws, *d*. This rod was outside of the integuments, and was of necessity parallel with the shaft of the bone. The only motion then possible was a rotary one upon the screws. This was prevented by straight splints upon opposite sides of the thigh. The same thing might have been accomplished by applying another instrument at right angles to the first."

Bolton recommended that his instrument be applied to other long bones and to the lower jaw. (From *Confederate States Medical and Surgical Journal*, Vol. 1, No. 4, pp. 55-56, April, 1864.)

pressed in the letter to Carrington that probably forced his concern with the

problem of fractures. His ingenuity suggested the solution which he presented in his article.

The fact that we do not speak of a Bolton splint today is sufficient proof that his suggestion was not immediately embraced by an eager profession. Bolton himself indicates the reason for this in a footnote to the article describing his instrument. He states:

"It may be objected that by this method a simple fracture may be converted into a compound one, but a careful consideration will lead to the conviction that this result ought not to occur. In the case of gun shot wound the fracture is already compound."³

A glance at the surgical practise of Bolton's era will enable us to understand why this method was not adopted. W. W. Keen, the Philadelphia surgeon who served with the Union Army, described this period thus:

"A comparison between the danger of immediate death in battle or later from wounds in the Battle of Gettysburg, and of the danger of death from the surgery of Civil Life in the '60's, shows that it was seven times safer to fight all through the three days of Gettysburg than to have an arm or a leg cut off or to be run over and suffer a compound fracture of the leg and be treated in a city hospital, with the septic surgery we then practiced!"⁸

In these times the foremost surgical opinion held immediate amputation to be the best procedure for compound fractures of the long bones. Surgeons were reluctant to try the ordinary conservative methods at hand. Bolton's method must have seemed extremely daring and equally dangerous. In such a situation we can understand the failure of Bolton's method to take hold.

Unfortunately, as often happens in the history of science, the seed of James Bolton's new concept fell on the barren soil of pre-Listerian surgery. It could not possibly germinate at a time when a

surgeon as outstanding as S. D. Gross would begin an operation by giving "a last fine touch to his knife on his boot—even on the sole—and then at once use it from the first cut to the last."⁸

Strikingly enough, as Bick in his "Source Book of Orthopaedics" points out, it was not proved until the period following the last war with the work of Bohler "that the traditional fear of infecting bone was baseless in the presence of adequate asepsis."⁹

Shaar and Kreuz in their recent "Manual of Fractures" speaking of Bohler's influence in this direction say, "His persistent efforts and successes were chiefly responsible for the gradual elimination of pin phobia held then by many surgeons, and still retained by some today."¹⁰

If this hesitancy is still retained today, we can feel no less than admiration for Bolton's intrepidity and yet fully understand why it was not adopted by the surgeons of his day.

The last issue of the Confederate States Medical and Surgical Journal appeared in January, 1865, and the Confederacy collapsed three months later. James Bolton's "New Method" was buried with the journal for which he wrote and with the cause which he served.

Asepsis was introduced by Von Bergmann and formulated and developed by Simmelbusch in 1892, as a substitute for antisepsis.¹¹ In 1897, Clayton Parkhill, an American surgeon, introduced a new apparatus employing rigid fixation in the treatment of fractures of long bones.¹⁰ This contribution being nourished by modern technical as well as medical science is still in the process of development today.

However, the story of James Bolton is not without meaning. It suggests that a study of the history of medicine must reveal a mine of prematurely conceived ideas. These ideas may require only transplantation into the more fertile environment of our modern scientific period

in order to bring them to the full maturity of practical utility.

REFERENCES

1. STERN, B. J. Social Factors in Medical Progress. P. 111. New York, 1927. Columbia University Press.
2. BICK, E. M. Source Book of Orthopaedics. Pp. 176, 181. Baltimore, 1937. Williams and Wilkins.
3. BOLTON, JAMES. New method of treating ununited fracture of long bones. *Confederate States M. & S. J.*, 1: 55, 1864.
4. BLANTON, W. B. Medicine in Virginia in the nineteenth century. *Tr. Am. M. A.*, 31: 1019, 1880.
5. Original in the records of the War Department Confederate States of America: The National Archives, Washington, D. C.
6. SHAAR, C. M. and KREUZ, F. P. Manual of Fractures—Treatment by External Skeletal Fixation. P. 1. Philadelphia, 1943. Saunders.
7. BOLTON, JAMES. A simple interdental splint. *Richmond M. J.*, 1: 318, 1866.
8. KEEN, W. W. The contrast between the surgery of the Civil War and that of the present war. Reprinted from the *New York M. J.*, April 24, 1915.
9. BICK, E. M.²
10. SHAAR, C. M. and KREUZ, F. P.⁶
11. STERN, B. J.¹
12. SCHWARTZ, L. L. The development of the treatment of jaw fractures. *J. Oral Surg.*, 2: 212, 1944.

